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# ASARCO

September 6, 2000

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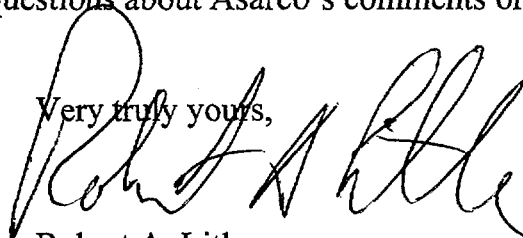
**Re: Draft Baseline Risk Assessment - Vasquez Boulevard/I-70 Superfund Site**

Dear Ms Lavelle:

Enclosed are Asarco's comments on the public review draft of the Baseline Human Health Risk Assessment dated July 2000. Our comments are in the form of two memoranda, one prepared by Exponent and one prepared by EnviroGroup Limited.

Please call me if you have any questions about Asarco's comments or need further information.

Very truly yours,



Robert A. Little

Enclosure

cc: Workgroup Members

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EPA REGION VIII  
SUPERFUND BRANCH

## EXTERNAL MEMORANDUM

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TO: Bob Litle, Asarco  
CC: Linda Larson, Heller Ehrman; Dave Folkes, Envirogroup  
FROM: Joyce Tsuji  
DATE: September 5, 2000  
CONTRACT: 8601184.001 0101 0900 JT01  
SUBJECT: Comments on EPA's July 2000 Draft Baseline Human Health Risk Assessment for the Vasquez Boulevard and I-70 Superfund Site

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Exponent has reviewed EPA's July 2000 draft of the Baseline Human Health Risk Assessment for the Vasquez Boulevard and I-70 Superfund Site, and our comments are offered herein. The comments below are presented by topic followed by specific comments on sections of the report.

### **Explanation of Risk Assessment**

Explanation of risk assessment and the results of risk assessment would be helpful to the reader for understanding the meaning of this report and its findings. Such information should be provided in the Executive Summary, Introduction, and the sections presenting the risks. For example, the document should clarify that the purpose of EPA risk assessment is not to predict actual risks of the community; rather, hypothetical upper-end risks are estimated in order to make regulatory decisions to protect public health. Risk estimates represent a theoretical upper-bound incremental risk above the 1-in-3 background risk for contracting cancer in a lifetime. An increase in risk of  $1 \times 10^{-4}$  or 1 in 10,000 represents a 0.03 percent increase in risk over background. This risk estimate also only applies to a hypothetical person who has the upper-end exposure and risk characteristics assumed (e.g., stays at home 350 days per year from birth to age 30, ingesting soil and dust with upper-bound arsenic concentrations daily even in winter, susceptible to arsenic toxicity). Thus, risk estimates do not represent actual population prevalence of cancer that one might expect in the community.

Similarly, the numbers of houses in excess of a specific risk level do not mean that the people in these houses have this risk level. The risk of the individuals in the houses would depend on their specific exposure and risk characteristics, which likely would result in less risk than assumed in the risk assessment. For example, although some people in the community may have lived in their houses for more than 30 years, few if any would have lived in a house from birth to age 30, never leaving except for 2 weeks of the year. Even fewer would ingest soil daily only at their house, 350 days per year.

## **Data Treatment**

An adequate data summary should be provided with the risk assessment document to allow reproduction of all calculations performed therein. A complete technical review of the methods used is not possible due to the lack of concentration data provided.

The risk assessment should provide a discussion of the accuracy of the XRF data used in this assessment and/or refer to the document where detailed information can be found. Section 2.5.1 discusses the fact that a subset of samples was selected for TAL analysis, with the "chief purpose...to assess the accuracy of the XRF measurements for arsenic and lead." The results of this analysis should be summarized in the risk assessment, with a discussion of the accuracy and precision of the XRF data upon which the risk assessment is based. Any consistent bias in the XRF data relative to the ICP method should be accounted for prior to calculating exposure-point concentrations.

The assessment should also provide a discussion of how non-detect data were handled.

## **Conceptual Site Model**

In the CSM, the "Other" contaminant source is linked to the media/transport pathways by a dashed line. It is not clear from the figure or the text why this is not a solid line, given the mounting evidence that sources other than smelters are the cause of high arsenic soil levels.

The conceptual model indicates that the groundwater and surface-water pathways are "complete and potentially significant," yet the text does not address quantitative evaluation of these exposure pathways. Although Section 1.2 of the Introduction states that this assessment focuses on soils in current residential and commercial (non-smelter) areas of the site, this distinction should also be made clear in the Executive Summary, Section 3.1, and a notation provided in the CSM. As it stands, the text in Section 3.1 is misleading, because it states that the greatest amount of attention is focused on pathways in Figure 3-1 that have a solid circle (as do the groundwater and surface water pathways).

Footnote "b" on the CSM is incomplete.

## **Exposure and Risk Calculations**

As noted above, some additional explanation of what the risk results mean would be helpful. To increase readability, scientific notation in the form of 1E-4 should not be used in the text. We recommend writing cancer risks as  $1 \times 10^{-4}$  or hazard quotients in decimal format, e.g., 0.1.

It would be helpful for understanding the calculations to present in one place the complete set of assumptions and equations used to calculate risks for the various pathways (e.g., soil, vegetables).

As a general statement, we recommend that all assumptions for the calculations be selected based on scientific accuracy, rather than biasing the outcome to obtain a specific cleanup goal. This report is a risk assessment, whereas the selection of cleanup goals and remedies is risk management, a separate process. Site-specific information should be considered where available and in the face of uncertainty, comparisons can be made to the scientific literature from other studies to bound the estimates. EPA guidance (Habicht 1992) has recognized that all assumptions should not be upper-bound estimates because the compounding effect of multiple high-end assumptions results in a scenario that would be virtually impossible in reality.

### **Garden Produce Ingestion Pathway**

Based on the information presented in the assessment, garden produce does not appear to be a health concern even from yards with highly elevated soil concentrations. This result is consistent with reports from numerous other sites with arsenic or lead in soil (Polissar 1987; Polissar et al. 1990; Bornschein et al. 1991; ATSDR 1992; BSBDH and University of Cincinnati 1992; ATSDR 1994; Colorado Department of Health 1994; Advanced Geoservices 1996; University of Cincinnati 1997a,b,c; Hwang et al. 1997; IDHW 1999). Although the text on page 19 states that "some studies suggest that the pathway may contribute a significant fraction of the total exposure," this statement lacks attribution and does not appear to be supported by the general literature for arsenic and lead exposure. Risk assessments of several other sites with arsenic and lead in soil have not found the vegetable ingestion pathway to be a significant driver of risk and cleanup levels (e.g., Glass and SAIC 1992; CDM 1996). Exposure studies of residents in these communities likewise have not shown significant exposure from homegrown vegetables based on levels in vegetables and biomonitoring results (Polissar 1987; Polissar et al. 1990; Hwang et al. 1997).

Based on the data collected from this site, it appears that there is:

- No association between arsenic concentrations in yard soil and garden soil, and that concentrations in garden soils remain relatively low despite the high range in yard soil concentrations. The document states (page 15, Figure 2-10) that no relation was observed between arsenic in yard soil and arsenic in garden soil, and concludes that the "source to yard soil does not apply to garden soil." (Note: Figure 2-10 should be amended to include  $R^2$  values with the regression equations.)
- Poor association between soil concentration and produce concentration. Further analysis presented in the document indicates little relation between garden soil concentration and produce concentrations of arsenic or lead ( $R^2$  value of 0.29; Figure 2-11). Only one garden (Property 6) had soil

concentrations above 37 ppm, and with the exception of one onion sample, vegetable samples from this garden were generally comparable to some individual samples of vegetables from other gardens with low soil arsenic concentrations.

Nevertheless, the risk assessment finds risks greater than  $10^{-4}$  for several gardens even though soil arsenic levels are undetectable for most of them. The high estimated risks are likely due to the relatively high arsenic concentrations in vegetables (even from gardens with low arsenic in soil) compared to the literature (Schoof et al. 1999) and from overestimated exposure assumptions (see below). The high arsenic concentrations in the vegetables could be attributed to soil contamination on the vegetables. The risk assessment does not explain how the vegetable samples were handled, although we learned at the meeting with EPA on August 18, 2000 that none of the vegetables were peeled and that they were rinsed with water in the field but not scrubbed. It is also unclear if individual leaves of greens such as cabbage or collard were rinsed.

The risk assessment seems to conclude that risks from intake of arsenic in garden vegetables are excessive when arsenic levels in garden soils exceed 50 mg/kg (Page 37, paragraph 5) based on two findings: 1) mean soil arsenic concentration for Property 6 was 51 mg/kg and the estimated RME risk for Property 6 exceeded  $1 \times 10^{-4}$ , and 2) the estimated RME garden vegetable arsenic intake from Property 6 was greater than typical dietary intake of arsenic ( $2.63 \mu\text{g/kg/day}$  vs.  $0.81 \mu\text{g/kg-day}$ ). However, the data presented in the risk assessment do not support such a conclusion. The site data are generally inadequate to fully characterize garden vegetable arsenic or garden soil arsenic concentrations in the community. Data from more than three vegetable types were collected from only 4 of 19 gardens. Moreover, only one garden (Property 6) had any soil samples with arsenic concentrations greater than 37 mg/kg. However, other properties exceeded a  $1 \times 10^{-4}$  risk level even though their arsenic concentrations in garden soil were very low and in many cases below detection limits. The estimated RME vegetable arsenic intake for Property 6 is likely overestimated and may be well within the dietary range.

The arsenic vegetable concentration on Property 6 is biased high by an onion sample that appears to be an outlier (as noted on Figure 2-11). The arsenic concentration of the onion sample (0.98 mg/kg wet weight) is approximately 5 times greater than that of the next highest sample (0.2 mg/kg for the turnip sample). A similar situation occurred on Property 11, where the initial garlic sample was 1.2 mg/kg (as reported in the EPA risk assessment meeting on August 8, 2000). Because soil from this garden had very low levels of arsenic, garlic was resampled and found to be much lower at 0.2 mg/kg. The onion sample from Property 6 should have been resampled as well. It is likely that the garlic and onion samples were contaminated with soil because they were not peeled. Not peeling onions and garlic misrepresents exposure because they are peeled before eating which would remove any soil trapped on or between the layers of skin. Excluding the onion sample gives a lognormal 95% UCL concentration of 0.2 mg/kg for the Property 6 garden vs. 0.5 mg/kg with the onion sample.

Other assumptions used in the risk assessment calculations also bias the risks for this property and the others high:

- EPCs were calculated in the risk assessment using the greater of the 95% UCL estimates for normal and lognormal distributions. However, U.S. EPA (1992) guidance recommends analyzing data sets to determine the best fit distribution. Analysis of the Property 6 garden produce arsenic data (excluding the potential outlier onion sample) shows the distribution to be more consistent with normality than lognormality. Using the appropriate equation to calculate the 95% UCL assuming a normal distribution (U.S. EPA 1992) gives an EPC of 0.14 mg/kg. For most vegetable gardens, however, the sample size was too small to use the 95% UCL for a lognormal distribution. With a small sample size, the maximum concentration becomes the EPC because the 95% UCL is greater than the maximum. If more samples were available, the 95% UCL would likely be lower than the maximum.
- Intake rates for homegrown vegetables from U.S. EPA (1997) are based on harvest, not consumption, and are averaged over the household. The amount harvested does not equate to the amount consumed because some is lost in preparation (peeling, paring, cooking, etc.), some spoils, and some is left uneaten when served. Also, some of the harvest may be canned, frozen, or given to others. U.S. EPA (1997) recommends applying a factor to account for weight loss during preparation. Table 13-7 in U.S. EPA (1997) reports preparation losses for vegetables ranging from 0 to 28 percent (Table 1). These estimated losses do not include spoilage or the portion given away.

**Table 1. Weight loss during preparation**

Vegetable	Weight Loss (percent)
Beets	28
Broccoli	14
Cabbage	11
Carrots	19
Cucumbers	18
Lettuce	22
Onions	5
Peas	2
Peppers	13
Pumpkins	19
Snap Beans	18
Tomatoes	15
Potatoes	0

Source: U.S. EPA (1997), Table 13-7.

Vegetable intake rates should be modified to include a preparation loss factor. The average loss for the 13 vegetables listed in Table 1 would be an appropriate estimate of preparation weight loss, i.e., 14 percent.

- Only a portion of the arsenic in vegetables is present in the inorganic form versus the organic form, which is considered relatively non-toxic. For example, in a market basket survey of inorganic arsenic in food that included 10 different vegetable types, the percent of arsenic present in inorganic form ranged from 9 percent in tomatoes to 100 percent in lettuce, spinach, and peas (Schoof et al. 1999). The average for all vegetables sampled was 59 percent. The risk assessment should take into account the fraction of arsenic that is present as inorganic arsenic when estimating arsenic intake from homegrown vegetables.

**Table 2. Fraction of arsenic in vegetables as total arsenic**

Vegetable	Inorganic Arsenic (percent of total)
Green Beans	57
Carrots	53
Corn	69
Cucumbers	43
Lettuce	100
Onions	34
Peas	100
Potatoes	29
Spinach	100
Tomatoes	9

**Source:** Schoof et al. (1999).

- Applying a factor that accounts for both preparation loss ( $1 - 0.14 = 0.86$ ) and the fraction of total arsenic present in the inorganic form (0.59) would reduce the estimated risks by approximately one-half (i.e.,  $0.86 \times 0.59 = 0.51$ ). This would put the estimated risk in three of the five gardens that the risk assessment identified as having elevated risks within the acceptable range (i.e.,  $10^{-6}$  to  $10^{-4}$ ). The risk of Property 11 drops to  $3 \times 10^{-4}$ . The EPC for this garden is determined by the garlic sample, which has a corresponding soil concentration of non-detectable for arsenic. For Property 6, applying the correction factor to the alternate EPC of 0.14 mg/kg (based on the assumption of a normal distribution and excluding the outlying onion sample, as described above) gives an estimated RME risk of  $2 \times 10^{-4}$ , only slightly above the

acceptable risk range, and well within the typical dietary intake of arsenic stated on Page 37. As stated in the risk assessment (page 37, paragraph 1), this relatively small magnitude of excess risk "...is due in most cases to the conservatism introduced by use of the 95% UCL of the mean rather than the mean concentration for the risk assessment." Actual exposures (and associated risks) are likely to be lower.

- The risk assessment also calculated intake rates assuming that intake of all homegrown vegetables was equivalent. Similarly, the risk assessment assumed that chemical concentrations in all vegetables and chemical intake from all vegetable types were equivalent. Data from other analyses and practical knowledge do not support these assumptions. As an example, review of Tables 13-35 through 13-60 of U.S. EPA (1997) (consumer-only intake of individual home-produced foods), shows that median consumer "intake" of homegrown onions (0.2 g/kg-day) is 5 times less than homegrown potatoes (1.3 g/kg-day). The differences are further accentuated when one considers that the rates cited above are harvest rates based only on survey responses where the specific vegetable was harvested during the 7-day survey period. Thus, growing season and the production capacity of specific vegetables in the typical home garden would further differentiate the intake rates. Differences in preparation loss rates would also differentially affect actual intake rates. Intake rate differences among individual vegetables and classes of vegetables is particularly important given that vegetables types likely differ in the amount of arsenic uptake.
- An EPA Region 10 risk assessment for the residential area near the Tacoma Smelter site (Glass and SAIC 1992) analyzed data from one of the largest known studies of metal uptake from soil into vegetables (Heilman and Ekuan 1977). This analysis showed that arsenic uptake differs depending on vegetable type. For root vegetables (the vegetable class into which U.S. EPA [1997] groups onions), arsenic concentrations were essentially constant over a wide range of soil concentrations. Leafy vegetable arsenic concentrations, however, increased slightly as soil arsenic increased. Given the small and uneven distribution of soil arsenic concentrations available in the VB/I70 study, and the relatively small number of vegetable samples collected, it is important to consider the results from analysis of larger datasets. The Heilman and Ekuan (1977) study included 228 garden vegetable samples and a range of soil arsenic concentrations from non-detect to almost 500 mg/kg, giving it more power to detect relationships than the VB/I70 dataset. While we do not recommend that the approach of Glass and SAIC be repeated for this site because of data limitations, the risk assessment could note the analysis and conclusions of Glass and SAIC (1992) that indirect ingestion of soil was the primary pathway of concern rather than vegetable ingestion. Citation of the literature on biomonitoring results of residents further supports



the conclusion that the homegrown vegetable pathway is not a concern for arsenic and lead in soil.

## **Assessment of Short-Term Exposures**

No mention of the assessment of short-term exposures is provided in either the section that presents the exposure assumptions (Section 4.2) or the Toxicity Assessment (Section 4.3). The first mention of short-term exposures appears in the Risk Characterization (Section 4.4). The document should be revised to include the necessary information in each appropriate section of the document.

We acknowledge the difficulties in determining an appropriate ingestion rate for short-term soil exposures. The data available on this topic are imprecise and do not allow for a good quantification of exposure rates. However, the exposure assessment should match the soil ingestion rate and the toxicity reference value to the appropriate age range used in selecting the body weight. The body weight selected for use in the assessment of short-term exposures is 10 kg, and is assumed to be representative of a 6- to 12-month-old child. A child of this age is unlikely to be left unattended or to incur large exposures in a residential yard, because they generally are not yet walking. The studies available in the literature tend to provide data on children who are at least 1 year of age. Other indirect information such as on blood lead levels suggests that 2-year-old children are more highly exposed than younger ages. Therefore, a body weight value of 12.3 kg, which is the average for children aged 1–2 years, would be a more accurate assumption. This body weight for 1- to 2-year-old children, however, is also very conservative when used with the subchronic reference dose which is based on exposures up to 15 years (see below).

A 10-kg body weight (for a 6- to 12-month-old) is very conservative for use with the subchronic RfD, which is based on studies in which health effects at the specified doses are documented in much older children (e.g., 0–9 years, (Mazumder 1998). Although the subchronic RfD is stated to be based on arsenic exposure periods of 6 months to 15 years, those showing effects in the literature studies for the shorter exposure periods had much higher doses than the subchronic RfD, and those showing effects at the lowest doses had longer exposure (e.g., see Mazumder et al. 1998; Tseng et al. 1968). Thus, even using a 12.3-kg body weight for a 1- to 2-year-old is still very conservative because the subchronic RfD is intended to be protective of children exposed up to age 15. Because arsenic toxicity is a function of both dose and length of exposure, the no-effect dose for 1 year of exposure should be higher than for 15 years of exposure. The subchronic RfD used by the risk assessment is from a 1995 EPA Region VIII memorandum. This subchronic RfD has been revised and has undergone outside peer review on a national level. The results of the latest evaluation incorporating newer information should be used.

The derivation of the subacute RfD needs more explanation. In particular, the lack of appearance of the primary studies in the Reference section indicates that only a secondary source was reviewed (the 1998 ATSDR toxicology profile). This secondary source, however, has been

found to have errors and needs updating. Information regarding the types of exposure and the age and characteristics of those exposed in the studies would be helpful for understanding whether the value is a reasonable and protective number. We are reviewing the recent literature on subacute effect levels and will provide our findings in a subsequent memorandum. A general comment in selecting a subacute RfD is that many of the short-term studies in the literature may be of longer exposure duration than considered by the subacute scenario.

The higher soil ingestion rates for short-term exposure may also be associated with a lower bioavailability than under the chronic incidental exposure scenario. The larger mass of soil in the gastrointestinal tract may provide more binding of metals and decrease their absorption. Some mention should be made of this conservative assumption.

## **Bioavailability**

The relative bioavailability adjustment factor (RBA) used in this draft risk assessment is a UCL that includes outlier data that appear erroneous. The draft document from which EPA selects the RBA used in this assessment (Relative Bioavailability of Arsenic in Soils from the VBI70 Site, U.S. EPA 2000) needs to be corrected, and the revised RBA incorporated into all risk calculations. In the meeting on August 14, EPA responded to our previous comments by noting that the outlier results were miscalculated and that the new UCL for bioavailability is 0.45 rather than 0.5. We recommend that all calculations be rechecked, not just the outlier results. We repeat for the record our previous comments below which were sent to EPA:

- On Figures 4-5, 4-6, 4-7, and 4-8, the regression equations for Days 10–11 are the same on all figures. It appears that the equation for NaAs appears on the following figures for soil. It is not clear whether this apparently erroneous equation was used in the soil calculations.
- The units for dose on Figures 4-1 through 4-8 appear to be incorrect. The units are listed as  $\mu\text{g}/48 \text{ hrs}$ .
- We are unable to reproduce the arsenic excretion values shown on Figure 4-6. We attempted to conduct this calculation by multiplying the urine volumes (Table C-3) by the urine arsenic concentrations (Table C-4). For days 8/9, Group 4 (TM4;  $50 \mu\text{g}/\text{kg}$  dose), we calculated 210.6, 283.5, 232, and  $223.6 \mu\text{g}$  for swine nos. 918, 929, 932, and 937, respectively. None of these values corresponds to the highest value for the low dose shown on Figure 4-6. Similarly for Group 5 (TM4;  $125 \mu\text{g}/\text{kg}$  dose) we calculated 273, 290.4, 433.6, and  $294 \mu\text{g}$  for swine nos. 913, 914, 919, and 939, respectively, none of which corresponds to the two highest values in the figure.
- We were unable to find the urine excretion values for days 10/11, and wonder if they are the values following the day 8/9 data that are listed as "day 1." If they are, then the same issue arises: we are not able to reproduce the outliers.

In the risk assessment document, the last sentence in the section on Uncertainty in Bioavailability (page 39) gives the misleading impression that the bioavailability study and data are uncertain to the point of being unreliable for predicting human exposures. Some mention should be made of the factors that are designed to increase the bioavailability estimate, such as administering the soil to juvenile swine, which tend to absorb metals to a greater extent than adult animals, and selecting the UCL of the bioavailability estimate rather than the most likely estimate.

### **Lead Risks and IEUBK Modeling**

The main text of the section on lead exposure and health risks contains some useful information that helps place the lead risks at VB/I-70 in perspective (e.g., the findings from EPA's 3-city urban abatement project). This information should also be mentioned in the Executive Summary.

In general, considerably little effort seems to have been devoted to accurately assessing lead risks in the community. With the exception of house dust, the IEUBK modeling conducted as part of this assessment uses mostly default inputs. Perhaps the thought was that because the arsenic levels were higher, any cleanup decisions would be driven by arsenic. Nevertheless, many of the properties with elevated lead levels do not have elevated arsenic levels. Consequently, more site-specific effort (e.g., *in vitro* bioaccessibility measurements, site-specific geometric standard deviation [GSD]) should have been devoted to assessing lead risks.

As noted by the report, the ratio of lead concentration in indoor dust to outdoor soil is affected by the presence of lead paint in some houses. Data from these houses biases the assumed effect of lead in soil on lead in house dust in the IEUBK model. Lead paint may also affect outdoor soil concentrations near the house. As a result, cleanup decisions for yard soil should consider the source of lead. Cleanup of soil will not address lead in the home from paint and cleanup to the lower levels for homes without lead paint problems is not necessary to protect health.

The *in vitro* bioaccessibility test was run for arsenic in soil and should have been run for lead as well. A considerable amount of data has been collected that shows good correlations between the *in vitro* test and the *in vivo* swine studies for lead (e.g., Ruby et al. 1999).

The IEUBK model is very sensitive to the selection of GSD. This value should represent the individual variation in blood lead level expected within a yard, not the variation in blood lead levels across a community. The IEUBK modeling included in this assessment incorporates the default GSD of 1.6. No effort seems to have been made to justify an appropriate assumption for this community. EPA Region VIII has found at several other sites that a value of 1.4 represents a more appropriate individual GSD. A discussion of the selection of an appropriate GSD and the technical derivation of the 1.4 value has also been published recently (Griffin et al. 1999). Griffin et al. (1999) note that calculations of the individual GSD are highly sensitive to the blood lead value assumed for non-detectable values. Using half the detection limit rather than near the detection limit for non-detected values results in a GSD higher than 1.4. However, it is

technically inaccurate to allow additional variation at the low end of the blood lead distribution to increase the risk of an elevated blood lead level at the upper end of the distribution. We recommend that EPA evaluate the available blood lead and environmental data and calculate a site-specific individual GSD if possible.

### **Miscellaneous Additional Comments**

**Page ES-8.** The discussion of the risk characterization on this page includes the first discussion of CTE and RME exposure estimates. These concepts should be introduced in the discussion of the exposure assessment.

**Page ES-9.** The first paragraph of this page states that an HQ value of 1.4 exceeds  $1E+00$ . All HQ values should be rounded to one significant figure before being compared to a "range of concern."

**Page 18, Inhalation of Soil/Dust in Air.** Additional discussion of the potential exposures and risks from inhalation of dusts should be included here. This could include the limitations of the available data, and a more complete discussion in the text of the calculations provided in Appendix B. Also, this section should reiterate why inhalation exposures to non-residential dusts are not included in this document (i.e., that they are part of a different Operable Unit).

**Page 19, last paragraph on workers.** This paragraph states that there is no known reason why commercial properties in the vicinity of the Globe site should be less contaminated than commercial properties in the vicinity of the VBI-70 site. More explanation for this statement is needed in light of what is known about the sites. For example, sampling on residential properties has shown higher arsenic concentrations in the VBI-70 area than near the Globe site.

**Page 24, Quantification of soil and dust ingestion.** The input values for exposure parameters assume that 100 percent of soil and dust ingestion exposure occurs 350 days/year from birth to age 30 years. Because the source area in this assessment is so small (i.e., one residential yard), the risk assessment should mention the conservativeness of this assumption. A more realistic assumption is to consider a fraction of exposure that would occur from the source area. Certainly, over the course of even 2 years, other, non-source areas would contribute to soil ingestion. Additionally, the exposure frequency could be adjusted to account for snow cover and inclement weather, which would decrease the amount of soil ingested.

**Page 26.** Tracer studies measuring soil ingestion in young children also support this ratio of indoor house dust ingestion to outdoor soil (Stanek and Calabrese 1992).

**Page 33, last paragraph.** This paragraph states that "the apparent absence of properties with an RME cancer risk above  $1E-04$  in Five Points and Globeville may be a consequence of the fact that only a small number of homes were sampled in these areas, rather than an authentic absence of impacted properties." Given the proximity of these areas to the Globe plant and the former Omaha Grant smelter relative to other areas of VBI-70, it seems odd that none of the homes

sampled were above  $1\text{E-}04$ , even with the small sample size. If the source of the arsenic contamination in the neighborhoods was related to emissions from smelters, one would expect more consistent elevations of arsenic in soil closer to the smelters, such that variation in sample size would have less impact. Variation in sample size has a greater impact when the pattern of contamination is random and unpredictable, which appears to be the case here.

**Page 35, exposure frequency.** Add "hot spot" after "yard soil."

**Page 38, second full paragraph.** This paragraph indicates that the bulk soil concentrations may underestimate the arsenic risk by about 20 percent, because arsenic concentrations tended to be higher in the fine fraction (which is the fraction to which people would more often be exposed). On the other hand, the XRF readings tended to be high relative to the ICP method used in the laboratory, which is the usual standard. Thus, the risk is not necessarily underestimated.

**Figure 4-1.** The title of this map indicates that it depicts areas of elevated cancer risks. The key, however, indicates that exposure point concentrations are mapped. The title and the key should be consistent.

Exponent appreciates the opportunity to offer comments on the Draft Baseline Human Health Risk Assessment for the Vasquez Boulevard and I-70 Superfund Site. Please contact me by phone or e-mail (tsujij@exponent.com ) if you have any questions.

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EnviroGroup Limited  
**CLIENT MEMORANDUM**

---

TO: Bob Litle, Asarco  
CC: Linda Larson, HEWM  
FROM: Dave Folkes, EnviroGroup  
SUBJECT: Comments on Draft Baseline Risk Assessment, VB-I70 Site  
DATE: September 6, 2000

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This memorandum provides my comments on the Baseline Human Health Risk Assessment report (public review draft) for the VB-I70 Superfund Site, prepared by ISSI Consulting Group, Inc. for the U.S. EPA, Region VIII, and dated July 2000.

#### **Section 1.2 Basis for Potential Concern**

p.1 This section of the report only identifies releases from the smelters as potential sources of soil contamination in the VB-I70 area. While we understand that this section addresses the initial basis for concern at the time of listing and may not reflect EPA's current or final conclusions regarding sources, we believe the statement is an inaccurate representation of information available to EPA at that time, and gives the reader a biased impression at the outset of this important report. Prior to site listing, EPA was also aware of evidence of pesticide impacts from the Globeville studies (e.g., EnviroGroup 1997) and pesticides should also have been considered *a priori* plausible sources of at least some of the contamination. Further, if this section is intended to represent the basis for concern at the time of listing, the wording should be in the past tense. If it is intended to reflect EPA's current basis for concern, the omission of any reference to pesticides is in direct conflict with many of the conclusions presented elsewhere in the report (e.g., p.5, p.17). We recommend the following revision:

"The source of these elevated levels is not known, but *a priori*, it **is** ~~was~~ considered plausible that the contamination ~~is~~ **was** associated with releases from the Globe facility and/or from one or both of two other smelters which previously existed in the area (the Argo Smelter and the Omaha and Grant Smelter), **and/or from historic applications of pesticides known to have been used in the area that contained both arsenic and lead.**"

#### **Section 1.4 Organization of this Document**

p.2 The term "smelter-related chemicals (metals)" implies that the metals can only be from the smelters and may confuse the reader. In fact, the metals are equally "pesticide-related" and "paint-related" and, of course, natural constituents of soil. We recommend striking the term "smelter-related chemicals".



#### **Section 2.4.2 Speciation of Arsenic and Lead**

- p.9 The report states that the “highest amount” of lead occurs as lead arsenic oxide. The term “amount” is vague, but may cause many readers to infer that lead most commonly occurs as lead arsenic oxide, when Figure 2.6 indicates that the soil mineral phases, e.g., lead phosphate and lead manganese oxide, occur more frequently and in greater total mass. It would be more accurate to say that the phase with the highest “concentration” in a single sample was lead arsenic oxide, but that may still be misleading unless the phase distribution is described more completely.

#### **Section 2.6.2 Residential Dust Sampling**

- p.14 The report notes there is only a weak correlation between arsenic and lead in soil and indoor dust, and that the source of high lead concentrations in dust at two locations “could be associated with lead paint”. In fact, the weak correlation between indoor dust and soil may indicate a common source of the lead, i.e., lead paint. We note that 130 of the 144 paint samples analyzed at VB-I70 exceeded the screening level of 1 mg/cm<sup>2</sup> for lead paint (see page 7 of report).

#### **Section 2.6.3 Residential Garden Sampling**

- p.15 The report states that no relationship was observed between arsenic in yard soil and arsenic in garden soil, and surmises that “whatever the source is for yard soil does not apply to garden soil”. We agree with this observation, which is consistent with the application of a lawn care pesticide (e.g., crabgrass killer) that, presumably, would not be applied to a garden, and is inconsistent with airborne fallout, which would impact both gardens and lawns (even if garden soils were diluted, a correlation should still exist).

However, we disagree with the statement that “garden soils are not equivalent to yard soils, presumably because most gardens are amended by addition of soil, peat, fertilizer, etc.” First, the arsenic concentrations observed in many yards are simply too high to be diluted to low levels by any reasonable amount of amendments. Second, we would still expect to see a significant (although weakened) correlation between yard soils and garden soils if dilution due to amendments was the only reason for differing concentrations.

The weak correlation between lead in garden and yard soils is consistent with lead paint and gasoline sources. Both garden and yard soils would be impacted equally by leaded gas emissions, although dilution of garden soils by amendments and tilling would reduce leaded gas contributions relative to surficial yard soils and varying amendment practices would also add some variance to the correlation. More

significantly, most gardens are not within the drip line of houses and are less likely to be impacted by lead paint chips than yard soil composites (which include sub-samples collected near the house and other painted structures).

#### **2.6.4 Sampling at Schools and Parks**

- p.16 We encourage EPA to look at the previous land use of the one school property with elevated arsenic concentrations. Was it formerly residential, or were the samples with high arsenic collected next to a residential property?

#### **3.1.3 Exposed Populations and Potential Exposure Scenarios**

- p.18 The term "smelter-related contaminants" is misleading and should not be used (see comment to Section 1.4, p.2).

#### **4.4.3 Risks from Home-Grown Vegetables**

- p.37 According to the report, the cause of elevated arsenic concentrations in vegetables at property 6 (0.17 to 0.98 mg/kg ww, see Table 4.3) is arsenic in the garden soil, at an average concentration of 51 ppm. However, the correlation between arsenic concentrations in garden soils and vegetables shown on Figure 2.11 suggests that the vegetable concentrations at property 6 are higher than expected based on the soil concentration.

#### **5.3.1 Risks from Lead in Soil and Dust**

- p.42 The percent of homes with average lead concentrations exceeding 400 ppm varies by neighborhood, according to the table on p. 42. A large body of technical literature, including studies published by EPA and HUD, have demonstrated that soils adjacent to houses with lead paint are likely to have elevated lead concentrations due to paint chips (e.g., see Battelle 1998<sup>1</sup>). These concentrations may range into the thousands of parts per million and may impact soils well beyond the drip line (e.g., see attached letter to Region VII EPA). Because the composite samples collected by EPA at the VB-I70 site include sub-samples located close to houses and other painted structures, the lead concentration is undoubtedly influenced by the presence of lead paint, found at 130 of 144 homes tested at the site (p.\_\_). Therefore, we recommend that EPA look for correlations between average lead concentration and house age, construction (brick or frame), condition, and size of property. The property size is important because smaller properties are more likely to have a greater percentage of the yard (and, therefore, composite sub-samples) that is in close proximity to a painted structure.

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<sup>1</sup> Battelle Memorial Institute, February 1998. Sources of Lead in Soil: A Literature Review. Prepared for U.S. EPA, Report No. EPA 747-R-98-001a.

Memo to Bob Litle  
September 6, 2000  
Page 4 of 4

In addition, we recommend that EPA not evaluate site wide trends in lead concentrations in isolation, which may lead to invalid conclusions regarding both the distribution and sources of the lead, but also consider trends already established by the USGS and Skyline Labs, Inc. across the Denver metropolitan (and Front Range) area. These data clearly show that soil lead concentrations are highest along the South Platte River urban corridor, generally increasing to the southwest of the VB-I70 area.

attachment



**EnviroGroup Limited**  
*The environmental solutions company*

HE-0312

June 23, 2000

Linda R. Larson, Esquire  
Heller, Ehrman, White & McAuliffe  
6100 Columbia Center  
701 Fifth Avenue  
Seattle, WA 98104-7098

Dear Linda:

As you requested, this letter provides the results of lead paint and soil tests conducted at 1819 Wirt Street in Omaha, NE, a day care property where previous soil tests by the U.S. EPA indicated that lead concentrations in the yard (beyond the "dripline") exceeded the EPA removal action level of 400 ppm. The results of our tests, as described below, indicate that lead paint chips are responsible for elevated soil lead concentrations in soils beyond the dripline of the house.

**XRF SCREENING OF HOUSE**

The house at 1819 Wirt Street, built in 1905, is a single story, wood frame structure with deteriorated and peeling paint on all four sides, as indicated by Photos 1 through 6 (attached). AMI Group (AMI) of Omaha, NE was contracted to conduct an initial screening of the house using a portable XRF lead based paint spectrum analyzer (model RMD LPA-1) to determine whether lead was present in paint on the exterior of the house. AMI took 5 readings from the exterior of the house, at locations shown on Figure 1, and 12 calibration readings. All readings were above the EPA action level for lead in paint of  $1.0 \text{ mg/cm}^2$  (see Table 1), indicating the presence of lead paint.

**Table 1. XRF Readings of House Exterior Paint ( $\text{mg/cm}^2$ )**

North Side (1)	North Side (2)	South Side	East Side	West Side
2.2	>9.9	6.5	>9.9	>9.9

These findings are consistent with the technical literature, indicating that houses built prior to 1972 and particularly 1950 are likely to have at least one coat of lead paint still present on the structure (Francek, 1992, Schmitt et al. 1988, Mielke, 1991).

**SOIL SAMPLING AND TOTAL LEAD ANALYSES**

Two composite soil samples were collected from the four sides of the house, over the 0 to 2 inch depth interval (Figure 1). One composite sample on each side of the house was collected at a distance of approximately 2 feet from the structure (i.e., within the dripline), and the second composite sample was collected at a distance of approximately 6 feet from the structure (i.e., outside the dripline). An additional composite sample was collected approximately 28 feet southeast of the southeast corner of the house, in a location remote from painted structures.

Each composite consisted of 3 subsamples, all located an equal distance from the house (e.g., 2 feet or 6 feet) and about one foot apart in a direction parallel to the wall. The samples were collected using a clean hand trowel and placed in quart size ziplock plastic bags. Sampling equipment was decontaminated prior to the collection of each composite sample by brushing off visible dirt, washing the tool with Alconox and water, rinsing with distilled water, and allowing the tool to air dry. The samples were logged onto a chain of custody form and shipped to the Paragon Analytics, Inc. laboratory in Fort Collins, Colorado. Each composite soil sample was analyzed for total lead by EPA Method 6010B. The results of the analyses are presented in the laboratory report (Attachment 1) and are summarized on Table 2, below.

**Table 2. Results of Total Lead Analyses on Soil Samples (mg/kg)**

Sample No.	Pb Concentration (mg/kg)	Sample No.	Pb Concentration (mg/kg)
N-2'	1200	E-2'	1200
N-6'	850	E-6'	2600
S-2'	1200	W-2'	1200
S-6'	1600	W-6'	1200
Remote	260		

All eight samples collected within 6 feet of the house had elevated lead concentrations, ranging from 850 mg/kg to 2600 mg/kg, compared to a concentration of 260 mg/kg at the remote sample location (28 feet from the house). These data are consistent with lead impacts in soil due to lead paint, which are generally expected to be greater near the house than at remote locations. We understand this is the reason EPA collected separate yard (Y) and foundation or dripline (D) samples during its investigation program. We also understand that the decision to remediate properties was based on the maximum Y sample result.

According to the EPA Omaha Lead Refining Site Investigation Field Sampling Plan (FSP), Revision 1, dated March 22, 1999, EPA defined the foundation zone as the area within 2.5 feet of the house. However, the data presented herein show that, on three of the four sides of the house, samples collected at a distance of 6 feet had lead concentrations that were **higher than or equal to** the concentration found at 2 feet. Therefore, these data indicate



that lead paint impacts can extend well into the zone where EPA collected its yard (Y) samples<sup>1</sup>.

These findings are consistent with studies in the literature. For example, the results of a Minnesota Pollution Control Agency soil lead survey in 1985 indicated that lead concentrations in yard samples were intermediate between the high values in the foundation zone (within 5 ft. of the structure) and the low concentrations found in remote areas unlikely influenced by lead paint (e.g., public play grounds). Note that the foundation zone in the Minnesota study was considered to be twice as wide (5 ft) as that defined by the EPA FSP.

#### STEREOMICROSCOPY AND SEM ANALYSES

The two soil samples on the east side of the house (2' and 6' distances) and the remote sample (28' from house) were split in the field and sent to DCM Science Laboratory for stereomicroscopy analyses to detect the presence of paint chips in the samples. Paint chips were observed in all three samples, ranging from one small chip in the remote sample, to numerous chips in the E-6' sample (see DCM report, Attachment 2). Therefore, the sample with the highest lead concentration (E-6' at 2600 mg/kg) also had the greatest number of paint chips, while the sample with the lowest lead concentration (E-remote at 260 mg/kg) had the least. Observed paint chips ranged from 1 mm to 1 cm in size in the soil sample splits (which were not ground or sieved). The chips showed a high degree of weathering and were easily pulverized. Therefore, a significant percentage of the paint chips would likely remain in sample aliquots after pulverizing and sieving for total lead analyses.

Three paint chips from E-2' and E-6' and the one paint chip from E-remote were analyzed by a scanning electron microscope (SEM) equipped with an energy dispersive x-ray spectrometer (EDS). Complete elemental concentrations in weight percent oxides were determined for each paint chip, as reported in Attachment 2. The lead oxide (PbO) percent is shown below in Table 3.

Table 3. Lead Oxide Content in Paint Chip Samples

Soil Sample No.	Total Pb in Soil (mg/kg)	Paint Chip No.	PbO Content (%)
E-2'	1200	1	1.22
		2	1.88
		3	1.17
E-6'	2600	1	7.19
		2	12.79
		3	38.36
E-remote	260	1	0.85

<sup>1</sup> Soil lead concentrations reported by EPA for 1819 Wirt Street ranged from 83 to 745 for the yard samples, and 574 for the foundation sample. Only one yard sample exceeded 400 ppm.



These results show that lead was present in all paint chip samples selected for SEM/EDS analyses. The lead content of the paint chips varied considerably, from less than 1% in the remote sample to 38% in one chip from soil sample E-6'. Not surprisingly, E-6' also had the highest total lead concentration in the soil.

## CONCLUSIONS

Several important conclusions may be drawn from the results of the soil and paint chip tests at 1819 Wirt Street.

- Soil lead concentrations are related to the number of paint chips, and the lead content of the paint chips, in the soil.
- Lead paint impacts occur beyond the 2.5 foot dripline zone defined by EPA. In fact, the highest lead concentration (and number of paint chips and lead concentration in the paint chips) were found in a sample collected 6 feet from the house. On three out of four sides of the house, the lead concentration at 6 feet was equal to or higher than the concentration at 2 feet.
- Yard ("Y") soil samples collected by EPA during its investigation were likely impacted by lead paint chips at homes where lead paint was present on the structure, including 1819 Wirt Street. Therefore, cleanup decisions may have been triggered by lead paint. For example, the remote sample collected during this investigation, which only had one small paint chip with a relatively low lead concentration, was 260 mg/kg, likely more representative of soils not impacted by lead paint and well below the 400 mg/kg removal action level.
- The actual extent of lead paint impacts beyond the walls of a house are not well established and, to a certain extent, are likely site specific. Although higher lead concentrations are more likely to be found close to painted structures (e.g., house, fence, garage, wooden play area structures), the results of this investigation, as well as other studies in the literature, show that impacts due to lead paint can also exist several feet from the structure, beyond the actual dripline. Wind blowing, water runoff, lawn mowing, foot traffic, landscaping, and other activities and events are likely mechanisms by which paint chips become distributed across a yard.

## RECOMMENDATIONS

Thorough sampling and analysis, including stereomicroscopy and SEM analyses for lead paint chips, is necessary in each yard to determine the extent to which soils are impacted by lead paint, rather than other sources of lead in the environment. Samples should be examined for lead paint chips prior to pulverization and sieving. Setting an arbitrary distance for the foundation zone (or lead paint impacts) is not sufficient to ensure these impacts are negligible.



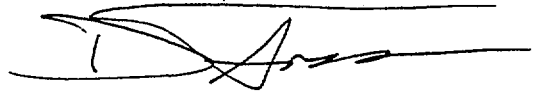
Linda R. Larson, Esquire

June 23, 2000

Page 5 of 5

Please call if you have any questions.

Sincerely,  
EnviroGroup Limited



David J. Folkes, P.E.  
Principal

enc.   Photos 1 through 6  
      Figure 1 – Sampling Locations  
      Attachment 1 – Paragon Report  
      Attachment 2 – DCM Report

cc:    Bob Litle, Asarco (w/enc)  
      Robert Ferri, Asarco (w/enc)  
      Peter Nickles, Esquire (w/enc)





**TARGET SHEET**  
EPA REGION VIII  
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 489848

SITE NAME: VASQUEZ BLVD & I-70  
DOCUMENT DATE: 6 Sep 00

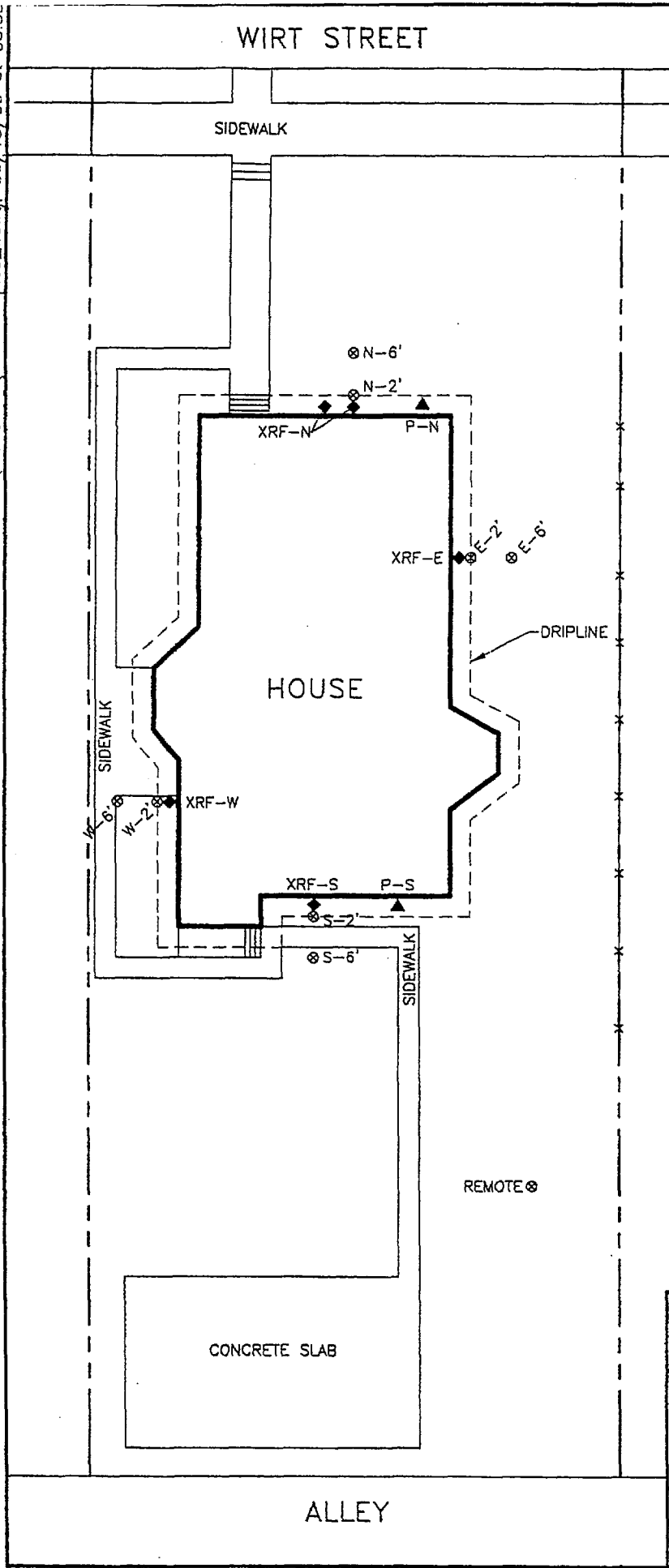
**DOCUMENT NOT SCANNED**

Due to one of the following categories:

- ☒ PHOTOGRAPHS
- ☐ 3 - DIMENSIONAL
- ☐ OVERSIZED
- ☐ AUDIO/ VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED  
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

3 PGS - 2 PHOTOGRAPHS PER  
PAGE

Figure 1 - Sampling Locations



LEGEND

- ⊗ SOIL SAMPLE
- ◆ XRF READING
- ▲ PAINT CHIP SAMPLE



HEMW/ASARCO/OMAHA  
Omaha, Nebraska

PHASE I  
1819 WIRT STREET  
SAMPLING LOCATIONS



EnviroGroup Limited  
Englewood, Colorado

FIGURE 1

JUNE 2000

HE-0312

## Attachment 1 - Paragon Report



## PARAGON ANALYTICS,

225 Commerce Drive ♦ Fort Collins, CO 80524 ♦ (800) 443-1511 ♦ (970) 490-1511 ♦ FAX (970) 490-1522

June 5, 2000

Mr. Ken Metzger  
Envirogroup Limited  
7208 South Tucson Way  
Englewood, CO 80112

RE: Paragon Workorder: 00-05-134  
Client Project Name: HEWM/ASARCO/OMAHA  
Client Project Number: HE0312

Dear Mr. Metzger:

Nine soil samples were received from Envirogroup Limited on May 20, 2000. The samples were scheduled for Total Lead (pages 1-21) analysis. The results for this analysis are contained in the enclosed reports.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

Paragon Analytics, Inc.  
Lori Pacheco  
Project Manager

LMP/mj  
Enclosure: Report

# Paragon Analytics, Incorporated

## Sample Number(s) Cross-Reference Table

---

Paragon OrderNum: 0005134

Client Name: Envirogroup Limited

Client Project Name: HEWM/ASARCO/OMAHA

Client Project Number: HE0312

Client PO Number: HE0312

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Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
1819 wirt/Remote	0005134-1		SOIL	5/17/00	9:25
1819 wirt/N-2'	0005134-2		SOIL	5/17/00	9:20
1819 wirt/N-6'	0005134-3		SOIL	5/17/00	9:20
1819 wirt/S-2'	0005134-4		SOIL	5/17/00	9:40
1819 wirt/S-6'	0005134-5		SOIL	5/17/00	9:40
1819 wirt/E-2'	0005134-6		SOIL	5/17/00	9:30
1819 wirt/E-6'	0005134-7		SOIL	5/17/00	9:30
1819 wirt/W-2'	0005134-8		SOIL	5/17/00	9:50
1819 wirt/W-6'	0005134-9		SOIL	5/17/00	9:50



PARAGON ANALYTICS, INC.  
225 Commerca Drive Ft. Collins, CO 80524

(800) 443-1511 or (970) 490-1511  
(970) 490-1522 - Fax

CHAIN OF CUSTODY DATE 5/19/00 Page 1 of 1

ACCESSION NUMBER (LAB ID) 1000123456

REPORT TO: Ken Metzger  
COMPANY: Enviro Group Limited  
ADDRESS: 7208 S. Tullson Way, Ste. 125  
Englewood, CO 80112  
SAMPLER: K. Metzger  
(303) 790-1340 (303) 790-1347  
PHONE NO. FAX NO.

ANALYSIS REQUESTED

SAMPLE ID	DATE	TIME	MATRIX	Oil & Grease 9070/9071/413.2	418.1 - TPH	8015 Mod. - Gasoline	8015 Mod. - Diesel	8015m/8020 - Gasoline/BETX	8020 - BETX only	8240/8260 - GC/MS VOC's	8270 - GC/MS SVOC's	8080 - Pesticides/PCB's	8080 - PCB's only	8310/610 - HPLC PNA's	8150 - Herbicides	8141/614 - DP Pesticides	TOX - EDX - AOX - TX	Total Metals *(specify in comments)	TCLP: *(specify parameters in comments)	Gross Alpha / Beta	Gross Gamma	Gamma Spec	Isotopic Plutonium	Isotopic Uranium	Total Uranium (KPA)	Radium 226 / 228	Tritium (H3)	Strontium 89 / 90	8315 - Formaldehyde	% Moisture	Number of Containers
1819 wirt / Remote	5/17/00	0925	soil															X													
1819 wirt / N-2'		0920																X													
1819 wirt / N-6'		0920																X													
1819 wirt / S-2'		0940																X													
1819 wirt / S-6'		0940																X													
1819 wirt / E-2'		0930																X													
1819 wirt / E-6'		0930																X													
1819 wirt / W-2'		0930																X													
1819 wirt / W-6'	✓	0950	✓															X													

PROJECT INFORMATION

PROJECT NUMBER: HE0312  
PROJECT NAME: HEW/ASARCO/OMAHA  
P.O. NUMBER: HE0312  
TAT: ☐ STANDARD ☒ RUSH DUE 5/26/00  
SAMPLE DISPOSAL: ☐ HAZ WASTE \$5.00 ea ☐ RAD CHEM \$15.00 ea ☐ RETURN

SAMPLE ID

DATE  
TIME  
MATRIX  
ANALYST  
RECEIVED BY

RELINQUISHED BY: 1 RELINQUISHED BY: 2 RELINQUISHED BY: 3

Sign. K. Metzger 1210 Time Sign. Time Sign. Time  
Print Ken Metzger 5/19/00 Date Print Date Print Date  
Company Enviro Group Company Company

COMMENTS: For: Perchro: Analyze for Lead (Pb) only

Rush TAT due by 5/26/00.

Note: Please hold samples after analysis!

RECEIVED BY: 1 RECEIVED BY: 2 RECEIVED BY: 3

Sign. K. Campbell 1000 Time Sign. Time Sign. Time  
Print Ken Campbell 5/24/00 Date Print Date Print Date  
Company Paragon Company Company

\* DO NOT WRITE IN SHADED AREAS

DISTRIBUTION: White, Canary - PARAGON ANALYTICS, INC. Pink - Originator

# CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Envirogroup PROJECT MANAGER: LP  
 WORKORDER NO: 0005134 INITIALS: KC DATE: 5/20/00

1. Does this project require any special handling in addition to standard Paragon procedures? <b>IS PRE-SCREENING REQUIRED? (radiochemistry, DOE, etc.)</b>	Yes	<u>No</u>
2. Are custody seals provided on the cooler? If so, how many _____	<u>N/A</u>	<u>No</u>
3. Are the custody seals on sample containers intact?	<u>N/A</u>	<u>No</u>
4. Is there a Chain-of-Custody (COC) or other representative documents, letters, or shipping memos?	<u>Yes</u>	<u>No</u>
5. Is the COC complete? Relinquished: Yes <u>No</u> Analyses Requested: Yes <u>✓</u> No _____	<u>N/A</u>	<u>Yes</u>
6. Is the COC in agreement with the samples received? No. of Samples: Yes <u>✓</u> No _____ Sample ID's: Yes <u>✓</u> No _____ Matrix: Yes <u>✓</u> No _____ No. of Containers: Yes <u>✓</u> No _____	<u>N/A</u>	<u>No</u>
7. Were COC (if applicable) and sample labels legible?	<u>Yes</u>	<u>No</u>
8. Were airbills present and/or removable?	<u>Yes</u>	<u>No</u>
9. Are all aqueous samples requiring chemical preservation preserved correctly (excluding volatile organics)? Are all aqueous <b>non-preserved</b> samples at the correct pH?	<u>N/A</u>	<u>Yes</u>
10. Is there enough sample for requested analyses? If so, were samples placed in the proper containers?	<u>Yes</u>	<u>No</u>
11. Are all samples within holding times for the requested analyses?	<u>Yes</u>	<u>No</u>
12. Were all sample containers received intact? (not broken or leaking, etc.)	<u>Yes</u>	<u>No</u>
13. Are samples requiring no headspace (volatiles, reactive cyanide/sulfide), headspace free? Size of bubble _____ < green pea; _____ > green pea (List sample IDs and affected containers on Page 2)	<u>N/A</u>	<u>Yes</u>
14. Is Paragon to dispose of samples?	<u>5/22/00</u>	<u>No</u>
15. Were the sample(s) shipped on ice?	<u>N/A</u>	<u>No</u>
16. Were cooler temperatures measured at 2 - 6 °C ?	<u>N/A</u>	<u>No</u>
17. Were all samples cooled that should have been cooled?	<u>Yes</u>	<u>No</u>

Cooler #'s Box  
 Temperature 21°C °C  
 Project Manager Signature / Date: Y 5/22/00

A NO RESPONSE TO ANY QUESTION (EXCEPT # 1 and #14  
 REQUIRES THE COMPLETION OF PAGE 2 OF THIS FORM



# CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: EnviroGroup PROJECT MANAGER: LP  
 WORKORDER NO: 0005134 INITIALS: KC DATE: 5/20/00

- ☐ Custody seals on outside of shipping container broken.
- ☐ Custody seals on sample containers were broken.
- ☐ No Chain-of-Custody (COC) present.
- ☐ Number of samples on the COC do not match the number of samples received.
- ☐ Aqueous samples not preserved correctly (see pH discussion below).
- ☐ Samples received at inappropriate temperature.
- ☐ Insufficient sample to perform requested analyses.
- ☐ Extraction or analytical holding times expired in transit.
- ☐ Broken/leaking bottles and intact bottles received in same cooler (list affected sample IDs below)
- ☐ No analyses requested.
- ☐ Incorrect sample type received.
- ☐ VOAs not headspace free (list sample IDs and affected vials below)
- ☐ Airbills not present and/or removable (record applicable shipper's tracking number below)
- ☒ Other

Describe discrepancy:

Sample 1819WIRT/N-2' : Time on COC vs 0920  
Time on sample bag 0915

\* Time on COC will be used. # 5/22/00

Was the client contacted? ☒ No; ☐ Yes: Name \_\_\_\_\_ Date/Time \_\_\_\_\_

Was the pH of any sample adjusted by the laboratory? ☐ No; ☐ Yes (see Table below):

**NOTE:** No pH adjustments are to be made without prior consent of Project Manager.

Sample ID	Initial pH	Final pH	Type of Reagent Used	Lot No. of Reagent Used	Initials / Date

Project Manager Signature / Date: LP 5/22/00

**FedEx** USA Airbill

8182 9863 9050

RECIPIENT: PEEL HERE

1 From This portion can be removed for Recipient's records

Date 5/1/85 FedEx Tracking Number 818298639050

Sender's Name Engr. Melgar Phone 303 790-1345

Company ENVIRO GROUP

Address 7208 S JUDSON WAY STE 105  
ENGLAND CO

2 Your Internal Billing Reference

State CO ZIP 80110

3 To

Recipient's Name HTS

Phone 303 790-1345

Company Engr. Melgar

Address 7208 S JUDSON WAY STE 105  
ENGLAND CO

City FL State CO ZIP 80110



0123891

DELIVER

4a Express Package Service

☒ Next business morning

☐ Next business afternoon

☐ FedEx 2Day\*

Second business day

4b Express Freight Service

☐ FedEx Express Saver\*

☐ FedEx 1Day Freight\*

Next business day

☐ Call for Confirmation

☐ FedEx 2Day\*

Second business day

☐ FedEx 3Day Freight

Third business day

\*FedEx 1Day, 2Day and 3Day Freight are not available for international shipments. Delivery commitment may be later in some areas. Packages over 150 lbs. must be shipped by freight.

Package up to 150 lbs. First business day delivery to select locations.

**FedEx** Saturday Delivery

☐ Dry Ice

☐ Cargo Aircraft Only

and No Below:

☐ Credit Card

☐ Cash/Check

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

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☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

☐ Other Pkg.

Total Charges  
Credit Card Acct.

359

# Paragon Analytics, Inc.

## TOTAL LEAD CASE NARRATIVE

---



### Envirogroup Limited

HEWM/ASARCO/OMAHA -- HE0312

Order Number - 0005134

#### TABLE OF CONTENTS:

- Section 1: Case Narrative
- Section 2: Chain of Custody
- Section 3: Inorganic Qualifiers
- Section 4: Sample Results
- Section 5: Summary Report Forms

#### Section 1: Case Narrative

- 1.1 This report consists of 9 soil samples.
- 1.2 The samples were received intact on 05/20/00. The temperature of the samples upon receipt was 21° Celsius.
- 1.3 The samples were prepared for analysis based on SW-846, 3<sup>rd</sup> Edition procedures.  
For analysis by Trace ICP, the samples were digested following method 3050B and PAI SOP 806 Rev. 5.
- 1.4 The samples were analyzed following SW-846 3<sup>rd</sup> Edition procedures.

Analysis by Trace ICP followed method 6010B and PAI SOP 807 Rev. 4.

The relationship between intensity and concentration for each element is established using at least four standards, one of which is a blank solution. The equation which relates intensity to concentration is:

$$I = A_0 + (A_1 * c^n) + (A_2 * c^{2n})$$

where: I = intensity  
c = concentration  
A<sub>0</sub> = offset coefficient  
A<sub>1</sub> = gain coefficient  
A<sub>2</sub> = curvature coefficient  
n = exponent coefficient



During sample analysis concentrations are computed by the software and the results are printed in mg/L. The instrument software does not provide a printout which gives both intensity and concentration. The validity of the calibration equation is tested by analyzing the following solutions: a blank, a low level check solution with concentrations near the reporting limit, an Initial Calibration Verification (ICV) standard from a 2<sup>nd</sup> source standard solution with concentrations near the middle of the analytical range, a Continuing Calibration Verification (CCV) standard with concentrations at two times those in the ICV, and a readback of the highest calibration standard.

These solutions provide verification that the calibration equations are functioning properly throughout the analytical range of the instrument. During sample analysis dilutions are made for analytes found at concentrations above the highest calibration standard. No results are taken from extrapolations beyond the highest standard.

1.5 All standards and solutions are NIST traceable and were used within their recommended shelf life.

1.6 The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

1.7 General quality control procedures.

- A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in this digestion batch. There were not more than 20 samples in the digestion batch.
- The preparation (method) blank results associated with this batch were below the practical quantitation limits for the requested analyte.
- The laboratory control sample associated with this batch was within the acceptance limits. This indicates complete digestion according to the method.
- All initial and continuing calibration blanks associated with this batch were below the practical quantitation limits for the requested analyte.
- All initial and continuing calibration verifications associated with this batch were within the acceptance criteria for the requested analyte. This indicates a valid calibration and stable instrument conditions.
- The interference check samples, and high standard readbacks associated with Method 6010B analyses were within acceptance criteria.

1.8 Matrix specific quality control procedures.

PAI sample ID 0005084-1 was designated as the quality control sample for this analysis.

- A matrix spike was digested and analyzed with this batch. All acceptance criteria for accuracy were met.



- A sample duplicate was digested and analyzed with this batch. All acceptance criteria for precision were met.
- A serial dilution was analyzed with this batch. All acceptance criteria were met.

1.9 All samples required a dilutions to protect the Trace ICP from the overall high metals content of the samples.

The data contained in the following report have been reviewed and approved by the personnel listed below:

Darryl Patrick  
Darryl Patrick  
Senior Inorganic Chemist

6/2/00  
Date

SW  
Reviewer's Initials

6/2/00  
Date

#### CERTIFICATION

Paragon Analytics, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

# Paragon Analytics, Incorporated

## Sample Number(s) Cross-Reference Table

---

Paragon OrderNum: 0005134

Client Name: Envirogroup Limited

Client Project Name: HEWM/ASARCO/OMAHA

Client Project Number: HE0312

Client PO Number: HE0312

---

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
1819 wirt/Remote	0005134-1		SOIL	5/17/00	9:25
1819 wirt/N-2'	0005134-2		SOIL	5/17/00	9:20
1819 wirt/N-6'	0005134-3		SOIL	5/17/00	9:20
1819 wirt/S-2'	0005134-4		SOIL	5/17/00	9:40
1819 wirt/S-6'	0005134-5		SOIL	5/17/00	9:40
1819 wirt/E-2'	0005134-6		SOIL	5/17/00	9:30
1819 wirt/E-6'	0005134-7		SOIL	5/17/00	9:30
1819 wirt/W-2'	0005134-8		SOIL	5/17/00	9:50
1819 wirt/W-6'	0005134-9		SOIL	5/17/00	9:50

## SECTION 2: Chain of Custody



PARAGON ANALYTICS, INC.  
225 Commerce Drive Ft. Collins, CO 80524

(800) 443-1511 or (970) 490-1511  
(970) 490-1522 - Fax

CHAIN OF CUSTODY DATE 5/19/00 Page 1 of 1

ADDRESS NUMBER 10

REPORT TO: Ken Metzger  
COMPANY: Enviro Group Limited  
ADDRESS: 7208 S. Tuxson Way, Ste. 125  
Englewood, CO 80112  
SAMPLER: K. Metzger  
(303) 790-1310 (303) 790-1347  
PHONE NO. FAX NO.

ANALYSIS REQUESTED

SAMPLE ID	DATE	TIME	MATRIX	Oil & Grease 9070/9071/413.2	418.1 - TRPH	8015 Mod. - Gasoline	8015 Mod. - Diesel	8015m/8020 - Gasoline/BETX	8020 - BETX only	8240/8260 - GC/MS VOC's	8270 - GC/MS SVOC's	8080 - Pesticides/PCB's	8080 - PCB's only	8310/610 - HPLC PMA's	8150 - Herbicides	8141/614 - OP Pesticides	TDX - EDX - AOX - TX	Total Metals * (specify in comments)	TCLP: * (specify parameters in comments)	Gross Alpha / Beta	Gross Gamma	Gamma Spec	Isotopic Plutonium	Isotopic Uranium	Total Uranium (KPA)	Radium 226 / 228	Tritium (H3)	Strontium 89 / 90	8315 - Formaldehyde	% Moisture	Number of Containers
1819 wirt / Remote	5/17/00	0925	soil															X													
1819 wirt / N-2'		0920																X													
1819 wirt / N-6'		0920																X													
1819 wirt / S-2'		0940																X													
1819 wirt / S-6'		0940																X													
1819 wirt / E-2'		0930																X													
1819 wirt / E-6'		0930																X													
1819 wirt / w-2'		0930																X													
1819 wirt / w-6'	✓	0930	✓															X													

PROJECT INFORMATION

PROJECT NUMBER: HE0312  
PROJECT NAME: HEWM/ASARCO/ OMAHA  
P.O. NUMBER: HE0312  
TAT: ☐ STANDARD ☒ RUSH DUE 5/26/00  
SAMPLE DISPOSAL: ☐ HAZ WASTE \$15.00 ea ☐ RAD CHEM \$15.00 ea ☐ RETURN

COMMENTS: Lori Parker: Analyze for Lead (Pb) only.  
Rush TAT due by 5/26/00.  
Note: Please hold samples after analysis!

RELINQUISHED BY:

1	RELINQUISHED BY:	2	RELINQUISHED BY:
1210	Sign. <u>K. Metzger</u> Time	Sign.	Time
5/19/00	Print <u>Ken Metzger</u> Date	Print	Date
	Company <u>Enviro Group</u>	Company	Company

RECEIVED BY:

1	RECEIVED BY:	2	RECEIVED BY:
1000	Sign. <u>K. Metzger</u> Time	Sign.	Time
5/24/00	Print <u>Ken Campbell</u> Date	Print	Date
	Company <u>Paragon</u>	Company	Company

\* DO NOT WRITE IN SHADED AREAS

DISTRIBUTION: White, Canary - PARAGON ANALYTICS, INC. Pink - Originator



# CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Envirogroup PROJECT MANAGER: LP  
 WORKORDER NO: 0005134 INITIALS: KC DATE: 5/20/00

1. Does this project require any special handling in addition to standard Paragon procedures? IS PRE-SCREENING REQUIRED? (radiochemistry, DOE, etc.)	Yes	<u>No</u>
2. Are custody seals provided on the cooler? If so, how many _____	<u>N/A</u>	No
3. Are the custody seals on sample containers intact?	<u>N/A</u>	No
4. Is there a Chain-of-Custody (COC) or other representative documents, letters, or shipping memos?	<u>Yes</u>	No
5. Is the COC complete? Relinquished: Yes <u>✓</u> No _____ Analyses Requested: Yes <u>✓</u> No _____	<u>N/A</u>	No
6. Is the COC in agreement with the samples received? No. of Samples: Yes <u>✓</u> No _____ Sample ID's: Yes <u>✓</u> No _____ Matrix: Yes <u>✓</u> No _____ No. of Containers: Yes <u>✓</u> No _____	<u>N/A</u>	No
7. Were COC (if applicable) and sample labels legible?	<u>Yes</u>	No
8. Were airbills present and/or removable?	<u>Yes</u>	No
9. Are all aqueous samples requiring chemical preservation preserved correctly (excluding volatile organics)? Are all aqueous non-preserved samples at the correct pH?	<u>N/A</u>	No
10. Is there enough sample for requested analyses? If so, were samples placed in the proper containers?	<u>Yes</u>	No
11. Are all samples within holding times for the requested analyses?	<u>Yes</u>	No
12. Were all sample containers received intact? (not broken or leaking, etc.)	<u>Yes</u>	No
13. Are samples requiring no headspace (volatiles, reactive cyanide/sulfide), headspace free? Size of bubble _____ < green pea; _____ > green pea (List sample IDs and affected containers on Page 2)	<u>N/A</u>	No
14. Is Paragon to dispose of samples?	<u>5/22/00</u> <u>Yes</u>	<u>No</u>
15. Were the sample(s) shipped on ice?	<u>N/A</u>	No
16. Were cooler temperatures measured at 2 - 6 °C?	<u>N/A</u>	No
17. Were all samples cooled that should have been cooled?	<u>Yes</u>	No

Cooler #'s Box  
 Temperature 21°C °C  
 Project Manager Signature / Date: Y 5/22/00

A NO RESPONSE TO ANY QUESTION (EXCEPT # 1 and #14  
 REQUIRES THE COMPLETION OF PAGE 2 OF THIS FORM

# CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: ENVIRONMENT PROJECT MANAGER: LP  
 WORKORDER NO: 0005134 INITIALS: KC DATE: 5/20/00

- ☐ Custody seals on outside of shipping container broken.
- ☐ Custody seals on sample containers were broken.
- ☐ No Chain-of-Custody (COC) present.
- ☐ Number of samples on the COC do not match the number of samples received.
- ☐ Aqueous samples not preserved correctly (see pH discussion below).
- ☐ Samples received at inappropriate temperature.
- ☐ Insufficient sample to perform requested analyses.
- ☐ Extraction or analytical holding times expired in transit.
- ☐ Broken/leaking bottles and intact bottles received in same cooler (list affected sample IDs below)
- ☐ No analyses requested.
- ☐ Incorrect sample type received.
- ☐ VOAs not headspace free (list sample IDs and affected vials below)
- ☐ Airbills not present and/or removable (record applicable shipper's tracking number below)
- ☒ Other

Describe discrepancy:

Sample 1819WIRT/N-2: Time on COC vs 0920  
Time on sample bag 0915

\* Time on COC will be used. AP 5/22/00

Was the client contacted? ☒ No; ☐ Yes: Name \_\_\_\_\_ Date/Time \_\_\_\_\_

Was the pH of any sample adjusted by the laboratory? ☐ No; ☐ Yes (see Table below):

**NOTE:** No pH adjustments are to be made without prior consent of Project Manager.

Sample ID	Initial pH	Final pH	Type of Reagent Used	Lot No. of Reagent Used	Initials / Date

Project Manager Signature / Date: AP 5/22/00

**FedEx** USA Airbill

8182 9863 9050

818298639050

Phone 303 770-1000

Company ENVIRO GROUP

Address 7203 S JACOBSON LANE

City ENGLEWOOD

2 Your Internal Billing Reference

3 To Recipient's Name

Company

Address

We reserve the right to bill on PO terms.

City

State

ZIP

8182 9863 9050



0123891

Recipient's Copy

4a Express Package Service

☒ FedEx Priority Overnight

☐ FedEx Standard Overnight

☐ FedEx 2Day

☐ FedEx Express Saver

4b Express Freight Service

☐ FedEx 10 Day Freight

☐ FedEx 20 Day Freight

☐ FedEx 30 Day Freight

Hold Weekdays at FedEx Location

Hold Saturday at FedEx Location

Hold Sunday at FedEx Location

Hold Monday at FedEx Location

Hold Tuesday at FedEx Location

Hold Wednesday at FedEx Location

Hold Thursday at FedEx Location

Hold Friday at FedEx Location

Hold Saturday at FedEx Location

Hold Sunday at FedEx Location

Hold Monday at FedEx Location

Hold Tuesday at FedEx Location

Hold Wednesday at FedEx Location

Hold Thursday at FedEx Location

Hold Friday at FedEx Location

Hold Saturday at FedEx Location

Hold Sunday at FedEx Location

Hold Monday at FedEx Location

Hold Tuesday at FedEx Location

Hold Wednesday at FedEx Location

Hold Thursday at FedEx Location

Hold Friday at FedEx Location

Hold Saturday at FedEx Location

Hold Sunday at FedEx Location

### SECTION 3: Inorganic Qualifiers

### Inorganic Data Reporting Qualifiers

The following qualifiers are used by the laboratory when reporting results of inorganic analyses.

- Result qualifier -- If the analyte was analyzed for but not detected a "U" is entered.
- QC qualifier -- Specified entries and their meanings are as follows:
  - E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.
  - M - Duplicate injection precision was not met.
  - R - Spiked sample recovery not within control limits. A post spike is analyzed for all 6010B analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than 4 times the spike added concentration.
  - \* - Duplicate analysis (relative percent difference) not within control limits.

## SECTION 4: Sample Results

# Total LEAD

Method SW6010

## Sample Results

Lab Name: Paragon Analytics, Inc.  
Client Name: Envirogroup Limited  
Client Project ID: HEWM/ASARCO/OMAHA HE0312  
Work Order Number: 0005134  
Reporting Basis: As Received

Final Volume: 100 ML  
Matrix: SOIL  
Result Units: MG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	Flag	Sample Aliquot
1819 wirt/Remote	0005134-1	5/17/2000	5/24/2000	05/26/2000	N/A	5	260	25		1 G
1819 wirt/N-2'	0005134-2	5/17/2000	5/24/2000	05/26/2000	N/A	5	1200	25		1 G
1819 wirt/N-6'	0005134-3	5/17/2000	5/24/2000	05/26/2000	N/A	5	850	25		1 G
1819 wirt/S-2'	0005134-4	5/17/2000	5/24/2000	05/26/2000	N/A	5	1200	25		1 G
1819 wirt/S-6'	0005134-5	5/17/2000	5/24/2000	05/26/2000	N/A	5	1600	25		1 G
1819 wirt/E-2'	0005134-6	5/17/2000	5/24/2000	05/26/2000	N/A	5	1200	25		1 G
1819 wirt/E-6'	0005134-7	5/17/2000	5/24/2000	05/26/2000	N/A	5	2600	25		1 G
1819 wirt/W-2'	0005134-8	5/17/2000	5/24/2000	05/26/2000	N/A	5	1200	25		1 G
1819 wirt/W-6'	0005134-9	5/17/2000	5/24/2000	05/26/2000	N/A	5	1200	25		1 G

### Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: IT0005134-1

## SECTION 5: Summary Report Forms



# ICP Metals

Method SW6010

Method Blank

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Lab ID: IP000524-4MB

Sample Matrix: SOIL

% Moisture: N/A

Date Collected: N/A

Date Extracted: 05/24/2000

Date Analyzed: 05/26/2000

Prep Batch: IP000524-4

QCBatchID: IP000524-4-2

Run ID: IT000526-1A2

Cleanup: NONE

Basis: N/A

Sample Aliquot: 1 G

Final Volume: 100 ML

Result Units: MG/KG

File Name: TS00526

CASNO	Target Analyte	DF	Result	Reporting Limit	Result Qualifier	EPA Qualifier
7439-92-1	LEAD	1	5	5	U	

Data Package ID: IT0005134-1

# ICP Metals

Method SW6010

Blank Spike

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Lab ID: IP000524-4LCS

Sample Matrix: SOIL

% Moisture: N/A

Date Collected: N/A

Date Extracted: 05/24/2000

Date Analyzed: 05/26/2000

Prep Batch: IP000524-4

QCBatchID: IP000524-4-2

Run ID: IT000526-1A2

Cleanup: NONE

Basis: N/A

Sample Aliquot: 1 G

Final Volume: 100 ML

Result Units: MG/KG

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7439-92-1	LEAD	50	46.6	5		93	80 - 120%

Data Package ID: IT0005134-1

00016

# ICP Metals

Method SW6010

Matrix Spike

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Field ID: SHARED QC

LabID: 0005084-1MS

Sample Matrix: SOIL

% Moisture: 2.3

Date Collected: 11-May-00

Date Extracted: 24-May-00

Date Analyzed: 26-May-00

Prep Batch: IP000524-4

QCBatchID: IP000524-4-2

Run ID: IT000526-1A2

Cleanup: NONE

Basis: Dry Weight

Sample Aliquot: 1 G

Final Volume: 100 ML

Result Units: MG/KG

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7439-92-1	LEAD	10	U	54.9		10.2	51.2	97	75 - 125%

Data Package ID: IT0005134-1

**ICP Metals**  
**Method SW6010**  
**Duplicate Sample Results**

Lab Name: Paragon Analytics, Inc.  
Work Order Number: 0005134  
Client Name: Envirogroup Limited  
ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Field ID: SHARED QC Lab ID: 0005084-1	Sample Matrix: SOIL % Moisture: 2.3 Date Collected: 05/11/2000 Date Extracted: 05/24/2000 Date Analyzed: 05/26/2000	Prep Batch: IP000524-4 QCBatchID: IP000524-4-2 Run ID: IT000526-1A2 Cleanup: NONE Basis: Dry Weight	Sample Aliquot: 1 G Final Volume: 100 ML Result Units: MG/KG
--	---	---	--

CASNO	Target Analyte	Sample Result	Samp Qual	Duplicate Result	Dup Qual	Reporting Limit	Dilution Factor	RPD	RPD Limit
7439-92-1	LEAD	10	U	10.2	U	10.2	2	6	20

Data Package ID: IT0005134-1

# ICP Metals

Method SW6010

Serial Dilution

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Field ID: SHARED QC

Lab ID: 0005084-1

Run ID: IT000526-1A2

Date Analyzed: 26-May-00

Result Units: MG/L

CASNO	Target Analyte	Sample Result	Samp Qual	SD Result	SD Qual	EPA Qualifier	RPD
7439-92-1	LEAD	0.1	U	0.5	U		

Data Package ID: IT0005134-1

Date Printed: Friday, June 02, 2000

Paragon Analytics Inc.

LIMS Version: 1.858

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00019

# LEAD

Method SW6010

## Calibration Verifications

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Date Analyzed: 26-May-00

Run ID: IT000526-1A2

Result Units: MG/L

Lab ID	Verification Type	Spike Added	Result	Reporting Limit	Result Qualifier	% Rec.	Control Limits
CCV1	Continuing Calibration	0.5	0.481	0.05	N/A	96	90 - 110
CCV10	Continuing Calibration	0.5	0.472	0.05	N/A	94	90 - 110
CCV11	Continuing Calibration	0.5	0.476	0.05	N/A	95	90 - 110
CCV2	Continuing Calibration	0.5	0.482	0.05	N/A	96	90 - 110
CCV3	Continuing Calibration	0.5	0.489	0.05	N/A	98	90 - 110
CCV4	Continuing Calibration	0.5	0.5	0.05	N/A	100	90 - 110
CCV5	Continuing Calibration	0.5	0.519	0.05	N/A	104	90 - 110
CCV6	Continuing Calibration	0.5	0.473	0.05	N/A	95	90 - 110
CCV7	Continuing Calibration	0.5	0.483	0.05	N/A	97	90 - 110
CCV8	Continuing Calibration	0.5	0.479	0.05	N/A	96	90 - 110
CCV9	Continuing Calibration	0.5	0.471	0.05	N/A	94	90 - 110
ICV	Initial Calibration	0.25	0.245	0.05	N/A	98	90 - 110

Data Package ID: IT0005134-1

Date Printed: Friday, June 02, 2000

Paragon Analytics Inc.

LIMS Version: 1.868

Page 1 of 1

00020

# LEAD

Method SW6010

## Calibration Blanks

Lab Name: Paragon Analytics, Inc.

Work Order Number: 0005134

Client Name: Envirogroup Limited

ClientProject ID: HEWM/ASARCO/OMAHA HE0312

Date Analyzed: 26-May-00

Run ID: IT000526-1A2

Result Units: MG/L

Lab ID	Verification Type	Date Analyzed	Result	Reporting Limit	Flag
CCB1	Continuing Calibration	5/26/00	0.05	0.05	U
CCB10	Continuing Calibration	5/26/00	0.05	0.05	U
CCB11	Continuing Calibration	5/26/00	0.05	0.05	U
CCB2	Continuing Calibration	5/26/00	0.05	0.05	U
CCB3	Continuing Calibration	5/26/00	0.05	0.05	U
CCB4	Continuing Calibration	5/26/00	0.05	0.05	U
CCB5	Continuing Calibration	5/26/00	0.05	0.05	U
CCB6	Continuing Calibration	5/26/00	0.05	0.05	U
CCB7	Continuing Calibration	5/26/00	0.05	0.05	U
CCB8	Continuing Calibration	5/26/00	0.05	0.05	U
CCB9	Continuing Calibration	5/26/00	0.05	0.05	U
ICB	Initial Calibration	5/26/00	0.05	0.05	U

Data Package ID: IT0005134-1

Date Printed: Friday, June 02, 2000

Paragon Analytics Inc.

LIMS Version: 1.868

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## Attachment 2 - DCM Report



DCM Science Laboratory, Inc.  
12421 W. 49th Avenue, Unit #6  
Wheat Ridge, CO 80033

Optical Microscopy/Scanning Electron Microscopy Analysis

Client:	Analysis Date:	5-22-00
EnviroGroup, Ltd.	Receipt Date:	5-19-00
7208 S. Tucson Way, Suite 125	Client Job No.:	HE0312
Englewood, CO 80112	Project Title:	HEWM/Asarco/Omaha
	DCMSL Project:	EGL8/9

The scope of this project is to identify lead containing paint chips in three soil samples (client samples no. 1819 Wirt/Remote, 1819 Wirt/E-2' and 1819 Wirt/E-6'). The analysis was performed by stereomicroscopy and scanning electron microscopy (SEM) equipped with an energy dispersive x-ray spectrometer (EDS).

Using stereomicroscopy, paint chips from each sample were chosen for analysis by SEM/EDS. With the exception of sample no. 1819 Wirt/Remote, three paint chips from each sample were mounted on aluminum stubs and carbon coated for SEM analysis. Only one paint chip was identified in 1819 Wirt/Remote. Elemental analyses were performed on each chip at magnifications ranging from 120X to 800X, 20kV. The detector used by DCMSL detects sodium and heavier elements. Complete elemental concentrations in weight percent oxides are provided for each analyzed paint chip. Results may not equal 100% due to rounding. An SEM photomicrograph and EDS spectrum are also included for documentation.

Summary

Lead bearing paint chips were identified in each sample. Sample no. 1819 Wirt/Remote contained one small, white colored paint chip having dimensions of approximately 1mm. Samples no. 1819 Wirt/E-2' and 1819 Wirt/E-6' contain numerous white colored paint chips ranging from 1mm up to 1cm in size. The chips show a high degree of weathering and are easily pulverized. Of the three samples, sample no. 1819 Wirt/E-6' contains the highest number of paint particles. The detector used by DCMSL detects sodium and all heavier elements.

Results

Client Sample No.: 1819 Wirt/Remote  
DCMSL Sample No.: EGL8/9-1

Paint Chip #1

MgO	1.84%
Al <sub>2</sub> O <sub>3</sub>	9.20%
SiO <sub>2</sub>	13.87%
CaO	1.51%
TiO <sub>2</sub>	69.76%
FeO	2.36%
ZnO	0.61%
PbO	0.85%

Client Sample No.: 1819 Wirt/E-2'

DCMSL Sample No.: EGL8/9-2

	Paint Chip #1	Paint Chip #2	Paint Chip #3
MgO	12.13%	9.94%	1.61%
Al <sub>2</sub> O <sub>3</sub>	3.61%	5.07%	10.37%
SiO <sub>2</sub>	27.72%	30.24%	28.44%
CaO	5.54%	5.38%	21.82%
TiO <sub>2</sub>	37.79%	41.21%	32.38%
FeO	1.24%	1.25%	3.33%
ZnO	7.89%	3.04%	-
PbO	1.22%	1.88%	1.17%
Na <sub>2</sub> O	2.87%	2.01%	0.88%

Client Sample No.: 1819 Wirt/E-6'

DCMSL Sample No.: EGL8/9-3

	Paint Chip #1	Paint Chip #2	Paint Chip #3
MgO	5.85%	10.20%	5.03%
Al <sub>2</sub> O <sub>3</sub>	4.14%	4.56%	0.87%
SiO <sub>2</sub>	17.38%	22.07%	15.07%
CaO	5.41%	3.83%	1.93%
TiO <sub>2</sub>	56.39%	27.31%	21.08%
FeO	0.76%	0.32%	0.28%
ZnO	1.01%	13.63%	12.21%
PbO	7.19%	12.79%	38.36%
Na <sub>2</sub> O	0.87%	5.31%	5.18%

  
Analyst

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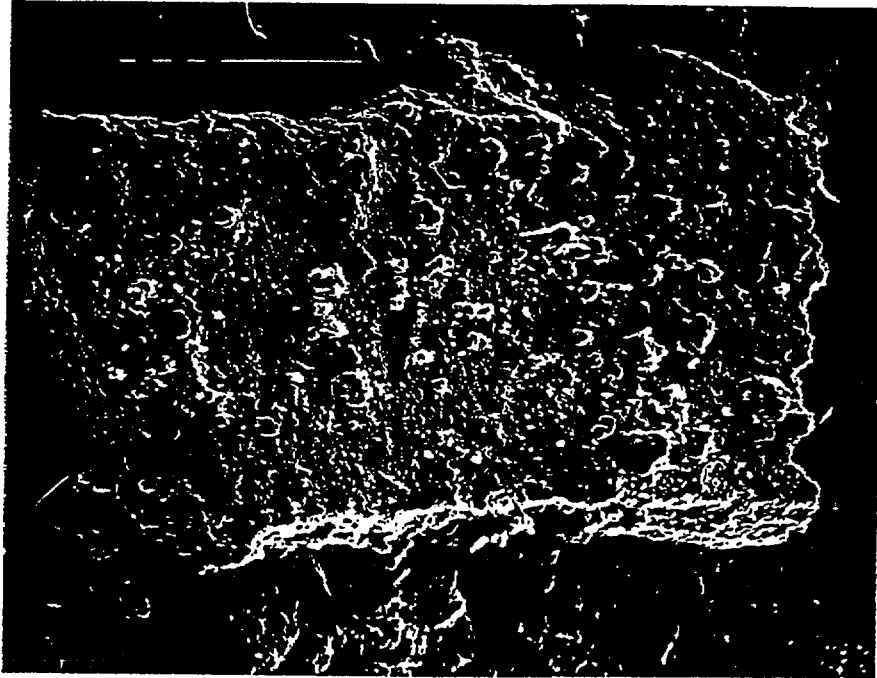


Photo 1: Paint chip from sample no. 1819 Wirt/E-2' - 200X.

DOM SOINJES WOO

$$4F \times 100 = 3402 = 3.4\%$$

3679-3 WIST/E-6 PRINT CHIPS #3 20KV

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